Making Data Work with
industrialized ML

Laure Willemin

Most of the ML models
**never make it
to production**

My journey

-2016

Basics of Data, Analytics & AI

Exploration & AI prototypes
AI Research Partnership launch
Big Data operationalization

2018

Prove Data, Analytics & AI

1st Productive AI for customers
Organizational consolidation
Extended reach

2022

Level-up Data, Analytics & AI

Harmonize MLOps
Company-wide education
ML accessible to everyone

2023+

Pervasive Data, Analytics & AI

Competitive advantage
All decisions data-informed
Data & AI culture

Data Acquisition

Build & inte-
gration testing

Model

Monitoring
& Logging

Automation

Exploration
& Validation

Wrangling
(Cleaning)

Understanding

Model development

Data

Test

Collaboration

Train

Code

Model
Packaging

Model
Engineering

Model
Evaluation

Deployment dev –
production

Things get complicated…

Business development

Data Engineer

Data Acquisition

Exploration & Validation

Wrangling (Cleaning)

Feedback

Monitoring & Logging

Data

Data Scientist

Train

ML Architect

DevOps

Model Engineering

Model Evaluation
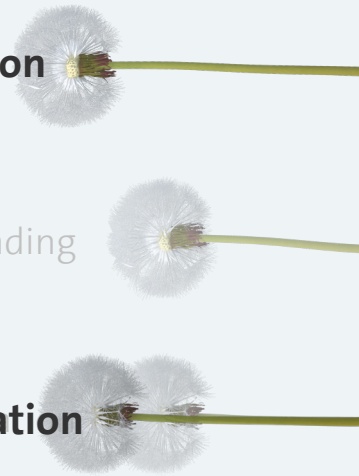
Model Packaging

Model

Code

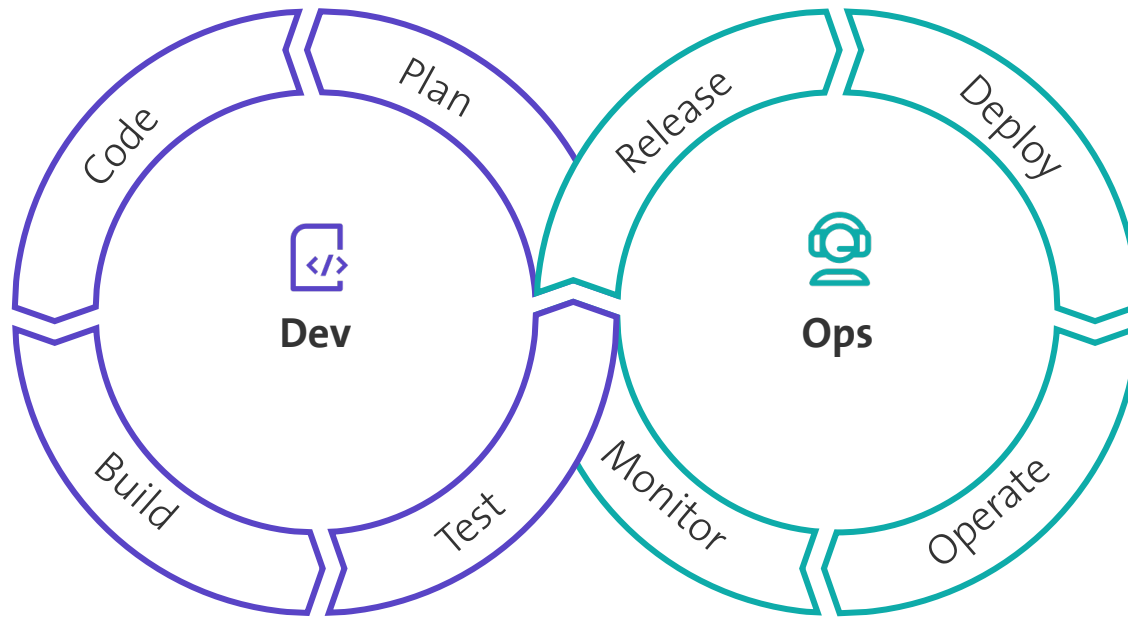Build & integration testing

Deployment dev –> production

Automation

Understanding

Collaboration
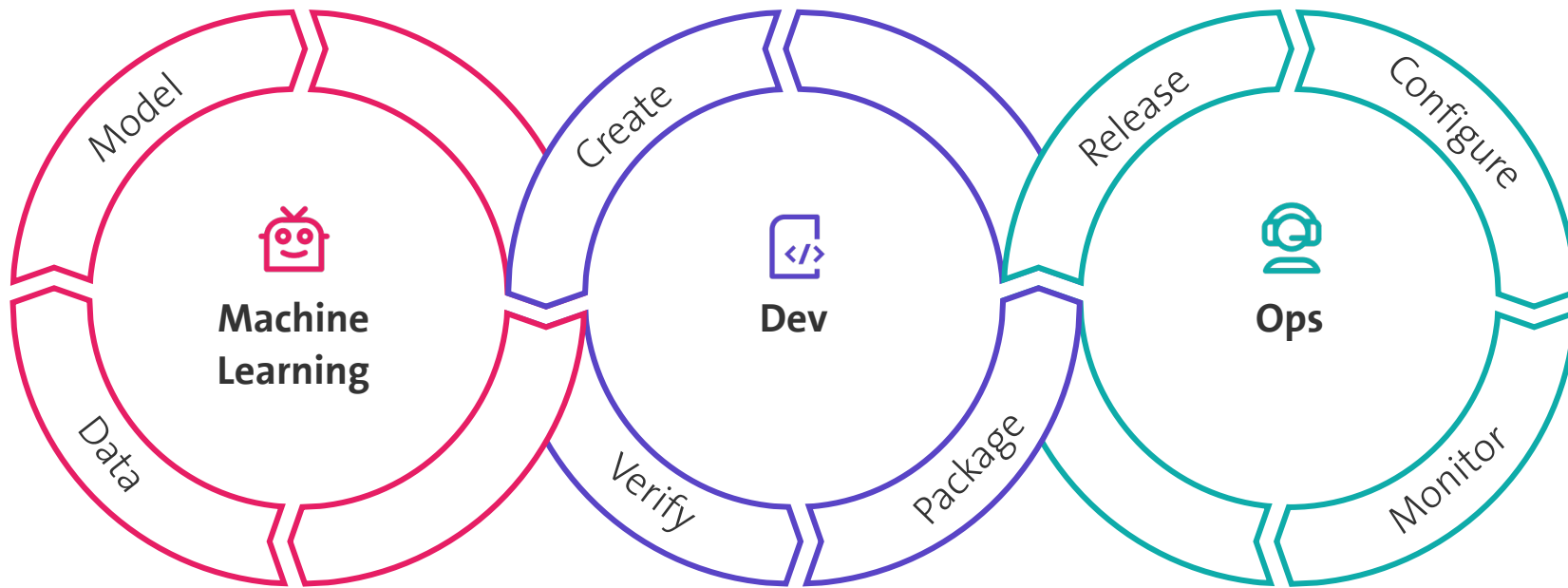
Looking back to my Software Engineering times...

Automation

Understanding

Collaboration

MLOps

Machine Learning
- Model
- Data

Dev
- Create
- Verify
- Package

Ops
- Release
- Configure
- Monitor

Automation

Understanding

Collaboration

Understand Business

Automation

Understanding

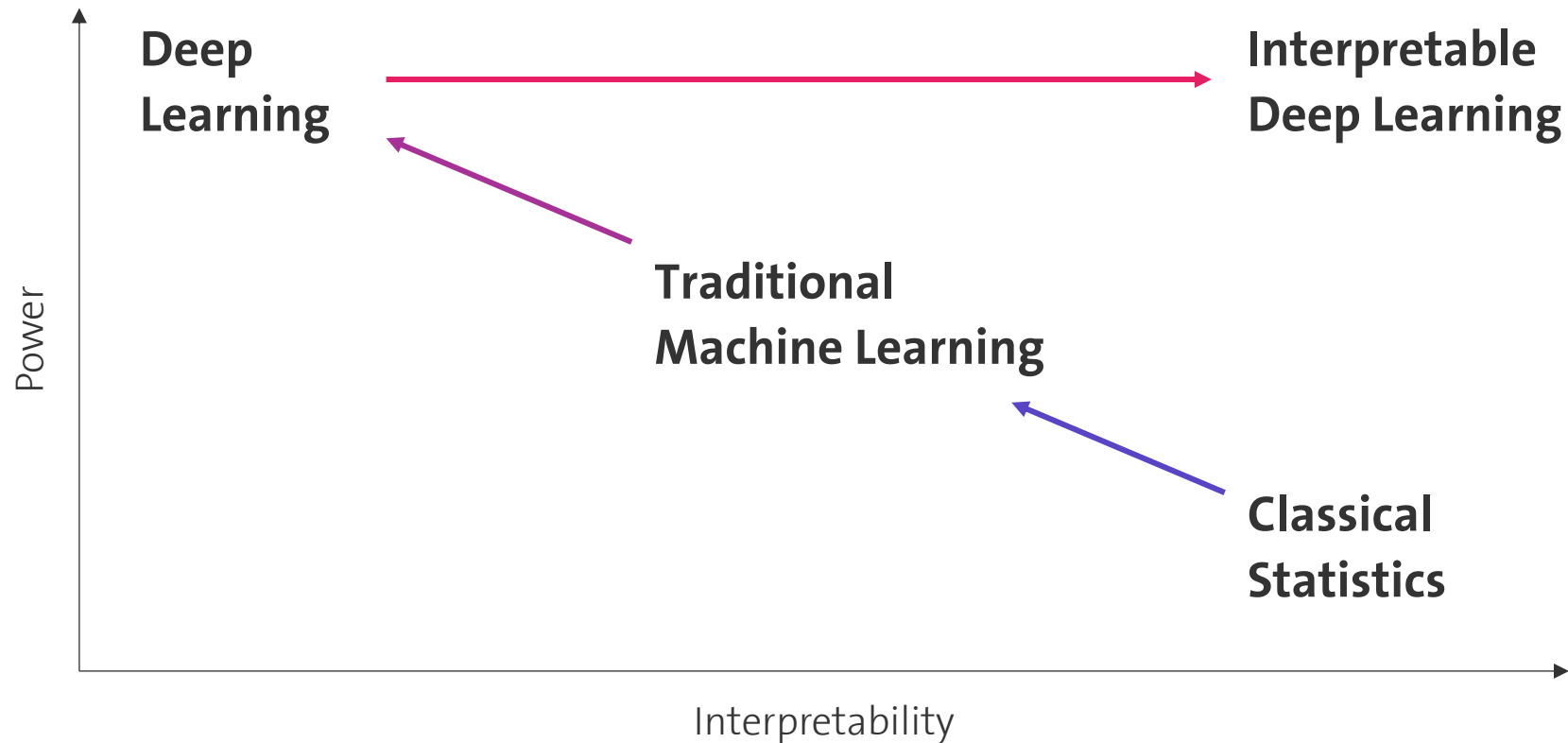Collaboration

Business
trust Machine Learning

Automation

Understanding

Collaboration

Why Interpretability for Deep Learning?

Approaches to Explain

Attribution-based

Assign importance/ contribution to input features

Output = 0.4

Age = 65
Sex = F
BP = 180
BMI = 40

Model

Base rate = 0.1

Explanation

Output = 0.4

+0.4 ← Age = 65
-0.3 ← Sex = F
+0.1 ← BP = 180
+0.1 ← BMI = 40

Base rate = 0.1
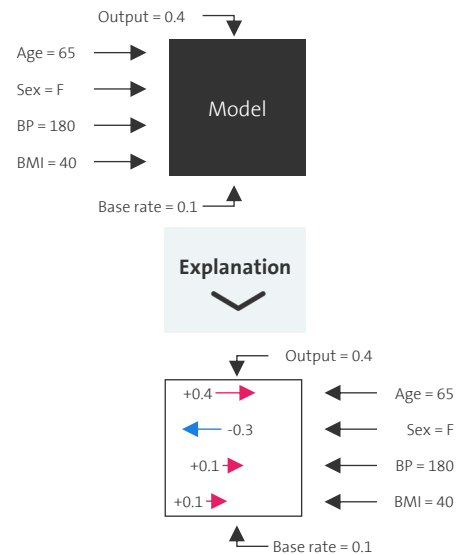
Rule-based

Extract logical rules (decision trees)

Average survival rate p_s = 39%

if   sex is mal
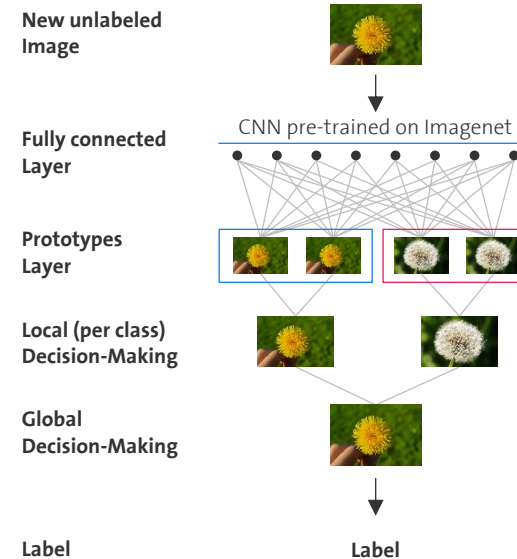**then** p_s = 19%
else p_s = 74%

if   1st or 2nd class
then p_s = 56%
else p_s = 24%

if   1st or 2nd class and sex is female
then p_s = 95%
else p_s = 25%

if   fare < 10.5£
then p_s = 20%
else p_s = 50%

Example-based

Provide datapoints that might be similar

New unlabeled Image

CNN pre-trained on Imagenet

Fully connected Layer

Prototypes Layer

Local (per class) Decision-Making

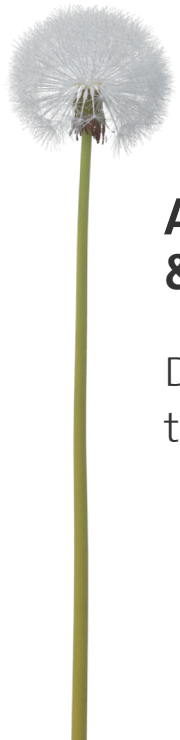**Global Decision-Making**

Label   **Label**

Automation

Understanding

Collaboration

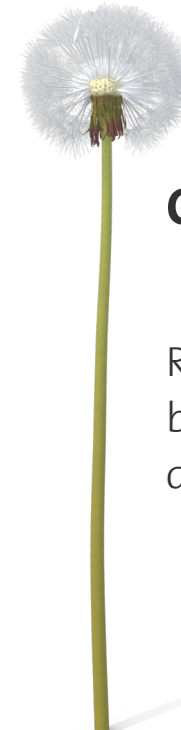# Augment the percentage of ML models in production with

Automation & Standardization

Dedicate Human time where they bring most value

Understanding

Demand, Goals, Models

Collaboration

Right skills mix, combine best data science with domain experts